and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic and at 47 by its thermal effects. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table IX for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun for an hour after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table IX for the stations at which instrumental self-registers are maintained.

The percentage of clear sky (sunshine) for all of the stations included in Table I, obtained as described in the preceding paragraph, is graphically shown on Chart VII. The regions of cloudy and overcast skies are shown by heavy shading; an absence of shading indicates, of course, the prevalence of clear, sunshiny weather.

The formation of fog and cloud is primarily due to differences of temperature in a relatively thin layer of air next to the earth's surface. The relative position of land and water surfaces often greatly increases the tendency to form areas of cloud and fog. This principle is perhaps better exemplified in the Lake region than elsewhere, although it is of quite general application. The percentage of sunshine on the lee shores of the Lakes is always much less than on the windward shores. Next to the permanent influences that tend to form fog and cloud may be classed the frequency of the passage of cyclonic areas.

The current month.—The geographic distribution of sunshine and, conversely, of cloudiness, is shown on Chart VII. The cloudiness of the upper Mississippi Valley, Missouri Valley, North Dakota, and the Lake region was excessive, due largely to the frequency of cyclonic storms. In general the cloudiness was greater than usual although a notable exception in the case of Gulf coast stations is to be noted. There was but little cloudiness on the southern slope and plateau.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.9	+0.4	Missouri Valley	5.8	+1.9
Middle Atlantic	5.3	+0.5	Northern Slope	4.8	+0.6
South Atlantic	4.8	+0.8	Middle Slope	3.7	+0.6
Florida Peninsula	5.2	+0.5	Southern Slope	2.2	−0.6
East Gulf	3.1	−0.5	Southern Plateau	1.4	−0.6
West Gulf	3.0	−0.6	Middle Plateau	4.2	+1.0
Ohio Valley and Tennessee	5.6	+1.1	Northern Plateau	4.9	−0.2
Lower Lake	6.8	+1.0	North Pacific Coast	6.2	+0.3
Upper Lake	7.4	+1.3	Middle Pacific Coast	4.2	+1.0
North Dakota	6.5	+1.4	South Pacific Coast	2.4	−0.6
Upper Mississippi Valley	6.5	+2.1			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Six hundred and nineteen reports of thunderstorms were received during the current month as against 825 in 1897, and 2,696 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 9th, 78; 10th, 60; 16th, 59; 4th, 53.

Reports were most numerous from Missouri, 67; Louisiana, 53; Arkansas, 41; Texas, 40.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, 1st, 2d, 3d, and 24th to 31st.

The greatest number of reports were received for the following dates: 13th, 4; 7th, 8th, 20th, 21st and 28th, 3.

Reports were most numerous from Montana, 6; North Dakota, 5.

In Canada.—Auroras were reported as follows: Father Point, 7, 17, 28, 29; Quebec, 29; Minnedosa, 7; Qu'Appelle, 19, 20, 21; Banff, 19, 20; Prince Albert, 7, 21, 23; Barkerville, 21.

Thunderstorms were reported as follows: Yarmouth, 30; Toronto, 4; Port Stanley, 4; Parry Sound, 3; Winnipeg, 1, 2; Minnedosa, 1, 2.

NOTES ON THE WEATHER OF THE WEST INDIES.

The following notes regarding the weather experienced in the West Indies will be of interest in connection with the climatological statistics at the end of Table I:

San Juan, Puerto Rico.—Observations at this station were begun on October 31. A very full and interesting report for November is expected.

Santiago, Cuba.—Owing to sickness of the regular observer, no mail reports were received from this station for October. Observations by the Juragua Iron Company, Limited, have been resumed at Firmeza, 16 miles east of Santiago and 5 miles inland from the Caribbean Sea. Copies will be furnished the Weather Bureau at an early date.

Basseterre, St. Kitts.—Although rain fell on eighteen days, but two thunderstorms were observed. The rains were rather evenly distributed throughout the twenty-four hours. Seven began between 6 a. m. and noon; 8 between noon and 6 p. m.; 7 between 6 p. m. and midnight, and 4 between midnight and 6 a. m.

Roseau, Dominica.—The observer arrived at this station on the 17th and the first observation was made at 6 a. m. of the 20th.

It is reported that the topography of Roseau and the immediate vicinity is not favorable to securing accurate records of the direction and force of winds from a northerly quarter.

Bridgetown, Barbados.—The observer makes frequent reference to the enervating effect of the weather at his station, due to the high temperature and humidity, the numerical values of which can be had from Table I.

There appears to have been a large number of night and early morning rains at this station. A count of the times that rain began gives the following results: Between 6 a. m. and noon, 7 times; noon and 6. p. m., 9 times; 6 p. m. and midnight, 8 times; midnight and 6 a. m., 13 times. A similar count for the remaining stations of the West Indian group does not show so great a preponderance of early morning rains. Thunderstorms occurred on the 4th, 14th, and 31st.

Willemstad, Curaçao.—The observer at Curaçao notes in his daily journal the fact that the mountains of Venezuela are visible on certain days. Eleven such dates were noted in his October journal. Rain was noted on 12 dates. The beginnings of rainfall were as follows: From 6 a. m. to noon, 8; noon to 6 p. m., 3; 6 p. m. to midnight, 2; midnight to 6 a. m., 4.

Colon.—The hour of the evening observation was changed